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(54) ALUMINUM FLAKE PIGMENT, METHOD FOR PRODUCING THE SAME AND COATING AND INK USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an aluminum flake pigment having a small average particle diameter and simultaneously a high bright feeling and high brightness.

SOLUTION: The aluminum flake pigment has aluminum flakes as substrate particles. The aluminum flakes have an average particle diameter within the range of 3-20 μ m and provide the aluminum flake pigment having ≥ 0.6 average value of minimum diameter/maximum diameter. The average aspect ratio of the aluminum flakes having ≤ 10 μ m diameter in the aluminum flakes is preferably within the range of 8-20. The aluminum flake pigment is a leafing type aluminum flake pigment and the average value of the adsorption amount of fatty acids on the surface of the aluminum flakes is preferably 0.0008-0.002 mole/cm².

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CLAIMS

[Claim(s)]

[Claim 1]

It is the aluminium flake pigment whose average of the diameter of the shortest / diameter of the longest it is the aluminium flake pigment equipped with an aluminium flake as a base particle, said aluminium flake is in the range whose mean particle diameter is 3-20 micrometers, and is 0.6 or more.

[Claim 2]

The aluminium flake pigment according to claim 1 with which the average aspect ratio of an aluminium flake 10 micrometers or less has a diameter in the range of 8-20 among said aluminium flakes.

[Claim 3]

Said aluminium flake pigment is an aluminium flake pigment according to claim 1 or 2 whose average of the fatty-acid amount of adsorption in the front face of said aluminium flake it is a leafing type aluminium flake pigment, and is 0.0008 - 0.002 mole/cm².

[Claim 4]

It is the manufacture approach of an aluminium flake pigment according to claim 1 to 3,

The manufacture approach of the aluminium flake pigment which uses grinding equipment equipped with the grinding media containing the spherical media which a diameter becomes from the quality of the material containing the steel in the range which is 0.3mm - 1.5mm, and is equipped with the step which flake-izes an aluminium powder in an organic solvent.

[Claim 5]

Said aluminium powder is the manufacture approach of the aluminium flake pigment according to claim 4 in the range whose mean particle diameter (D50aluminum) is 1.0-10.0 micrometers.

[Claim 6]

The coating containing an aluminium flake pigment according to claim 1 to 3 and a binder.

[Claim 7]

Ink containing an aluminium flake pigment according to claim 1 to 3 and a binder.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to a new aluminium flake pigment. It is related with the still more detailed aluminium flake pigment excellent in the design nature which has photoluminescent [with high this invention].

[0002]

Moreover, this invention relates to the manufacture approach of a new aluminium flake pigment. Furthermore, this invention relates to the coating containing a new aluminium flake pigment. And this invention relates to the ink containing a new aluminium flake pigment.

[0003]

[Description of the Prior Art]

Generally, there are a leafing type and a non leafing type of aluminium flake pigments. Here, a leafing type aluminium flake pigment is obtained by making saturated fatty acid, such as stearin acid, etc. into a grinding aid using grinding equipments, such as a ball mill which has steel and spherical grinding media, such as a steel ball, by grinding an aluminium powder with wet in organic solvents, such as a mineral spirit and solvent naphtha. Moreover, the above-mentioned saturated fatty acid etc. uses unsaturated fatty acid, such as oleic acid, etc. as a grinding aid instead of, and a non leafing type aluminium flake pigment is obtained by carrying out same grinding.

[0004]

Here, since a leafing type aluminium flake pigment has small surface tension, its compatibility with the solvent and binder which are contained in coatings is weak. Therefore, it floats in the surface side of a paint film, orientation is mostly carried out to homogeneity, and the feeling of a metal and base concealment nature which were excellent by this are shown.

[0005]

Compatibility with the solvent and binder which are contained in coatings on the other hand since a non leafing type aluminium flake pigment does not have so small surface tension is strong. Therefore, where orientation is mostly carried out to homogeneity, it is distributed over the interior of a paint film, and this gives a feeling of a metal to a paint film, and the so-called design of a metallic tone is shown.

[0006]

And although the metallic feelings of a paint film are a feeling of brightness, lightness, and a thing glitteringly recognized visually in combination, such as admiration, its inclination which desires a paint film with high brightness from the former is strong. A demand to the aluminium flake pigment which has a feeling of brightness especially high as a coating pigment to talc cans, such as a drink can, recently is high. Generally, a correlation is between the brightness of a paint film, and the mean particle diameter of an aluminium flake pigment, and what has larger mean particle diameter has higher brightness.

[0007]

on the other hand, the case where there is an inclination for the orientation of an aluminium flake pigment to be in disorder, at the time of paint film formation, and an aluminium flake pigment projects from a paint film, and BUTSU is seen on the surface of a paint film when the mean particle diameter of an aluminium flake pigment is large -- it is -- further -- a paint film -- admiration may become strong too

much glitteringly and it may not be desirable in design

[0008]

Therefore, mean particle diameter is small, coincidence is expected development of an aluminium flake pigment with high brightness, and many development efforts are made in every direction.

[0009]

With the leafing type aluminium flake pigment, various development is made as what can form the paint film which shows the high reflection factor represented by the feeling of a result of a chrome plating tone, for example, for example, the powerful photoluminescent coating using an aluminium flake pigment leafing type [with 0.1-1 micrometer / in thickness / and a mean particle diameter of 1-60 micrometers] etc. is indicated (for example, patent reference 1 reference.).

[0010]

Moreover, the technique about the coating using the leafing type aluminium flake pigment of the diameter of a particle is also indicated (for example, patent reference 2 reference.). This coating has the feeling of a metal which has photoluminescent [comparable as the vacuum evaporatio film], and it is indicated that it is suitable for the reflector of automobile beacon lights, such as a head lamp, a signal lamp, and a tail lamp, etc.

[0011]

and with a non leafing type aluminium flake pigment For example, it is in the (A) paint film formation resin 100 solid weight section and the range whose (B) mean particle diameter (D50) is 20**5 micrometers. With the metallic pigment constituent which is in the range whose particle average thickness (t) is 0.5-1 micrometer, and contains the aluminium flake pigment 0.1 whose inclination (n) in a rosin-RAMURA diagram is 2.7 or more - 30 weight sections it is indicated if strong brightness and the outstanding appearance can be given to a paint film at coincidence (for example, patent reference 3 reference --) .

[0012]

Moreover, the aluminium flake pigment with which the brightness of the average thickness of 0.2-0.7 micrometers, the mean particle diameter of 4-20 micrometers, aspect ratios 15-50, and (distribution constant n) ≥ 2.4 was high with the pigment, and rich in circulation-proof nature is indicated (for example, patent reference 4 reference.).

[0013]

However, even if it was a coating using these conventional leafing types of aluminium flake pigment, or a non leafing type aluminium flake pigment, a demand of as opposed to [in addition, mean particle diameter is small, and] an aluminium flake pigment with high brightness was not necessarily fully filled by coincidence.

[0014]

[Patent reference 1]

JP,2001-240808,A

[0015]

[Patent reference 2]

JP,2001-81359,A

[0016]

[Patent reference 3]

JP,8-170034,A

[0017]

[Patent reference 4]

JP,11-152423,A

[0018]

[Problem(s) to be Solved by the Invention]

It is offering the aluminium flake pigment which the main technical problems of this invention have small mean particle diameter, and has high brightness and brightness in coincidence based on the above-mentioned present condition. Moreover, another technical problem of this invention has small mean particle diameter, and is offering the manufacture approach of an aluminium flake pigment of having high brightness and brightness in coincidence.

[0019]

Furthermore, other technical problems of this invention are offering the coating in which high brightness and brightness are shown. And another technical problem of this invention is offering the ink in which high brightness and brightness are shown.

[0020]

[Means for Solving the Problem]

this invention person considered the configuration of an aluminium flake pigment, surface smooth nature, mean particle diameter, particle size distribution, average thickness, thickness distribution, an aspect ratio, etc. the brightness of the paint film containing the aluminium flake pigment concerned, and the relation of ** in the detail in order to solve the above-mentioned technical problem.

[0021]

Even if it adjusted the mean particle diameter and the aspect ratio of an aluminium flake pigment to the fixed range, or this invention person regulated the distribution constant (n) by the rosin-RAMURA diagram based on the well-known technique conventionally and it used the sharp aluminium flake pigment of particle size distribution in the process, when the average of the diameter of the shortest / diameter of the longest of the particle shape of an aluminium flake was not 0.6 or more, brightness found out falling.

[0022]

Then, when this invention person used the aluminium flake pigment of the leafing type which has a specific configuration, and/or the non leafing type aluminium flake pigment based on the new idea which is not in the former, the paint film obtained from the coating containing the aluminium flake pigment which has this specific configuration found out having high brightness and brightness.

[0023]

Moreover, this invention person completed a header and this invention for what is necessary being to use grinding equipment equipped with the grinding media which have the specific quality of the material, a configuration, and a diameter, to grind the aluminium powder of specific mean particle diameter in an organic solvent, and just to flake-ize, in order to obtain the aluminium flake pigment which has this specific configuration.

[0024]

That is, the aluminium flake pigment of this invention is an aluminium flake pigment equipped with an aluminium flake as a base particle, and this aluminium flake is in the range whose mean particle diameter is 3-20 micrometers, and is an aluminium flake pigment whose average of the diameter of the shortest / diameter of the longest is 0.6 or more.

[0025]

Here, it is desirable that the average aspect ratio of an aluminium flake 10 micrometers or less has a diameter in the range of 8-20 among this aluminium flake.

[0026]

Moreover, this aluminium flake pigment is a leafing type aluminium flake pigment, and, as for the average of the fatty-acid amount of adsorption in the front face of this aluminium flake, it is desirable that it is 0.0008 - 0.002 mole/cm².

[0027]

And the manufacture approach of the aluminium flake pigment of this invention is the manufacture approach of the aluminium flake pigment which uses grinding equipment equipped with the grinding media containing the spherical media which consist of the quality of the material containing the steel in the range whose diameter it is the manufacture approach of the above-mentioned aluminium flake pigment, and is 0.3mm - 1.5mm, and is equipped with the step which flake-izes an aluminium powder in an organic solvent.

[0028]

Here, as for this aluminium powder, it is desirable that it is in the range whose mean particle diameter (D50aluminum) is 1.0-10.0 micrometers.

[0029]

And the coating of this invention is a coating containing the above-mentioned aluminium flake pigment and a binder.

[0030]

Moreover, the ink of this invention is ink containing the above-mentioned aluminium flake pigment and

a binder.

[0031]

[Embodiment of the Invention]

Hereafter, the gestalt of operation is shown and this invention is explained more to a detail.

[0032]

<Aluminium flake pigment>

The aluminium flake pigment of this invention is an aluminium flake pigment whose average of mean particle diameter, and the diameter of the shortest / diameter of the longest is the specific range.

[0033]

Here, as for the aluminium flake which is the base particle of the aluminium flake pigment of this invention, it is desirable that it is the aluminium flake which makes a pure aluminum metal the quality of the material from control of mean particle diameter, a water surface diffusion area, a leafing value, etc. being simple. But the aluminium flake pigment of this invention may be equipped with the aluminium flake which makes the alloy of aluminum and other metals the quality of the material as a base particle, and may be equipped with the aluminium flake containing some impurities as a base particle.

[0034]

It is desirable that it is in the range of 3-20 micrometers, and if the mean particle diameter of the aluminium flake particle which is a base particle of the aluminium flake pigment of this invention is in the range which is 5-15 micrometers, it is still more desirable. the case where there is an inclination for the brightness of a paint film to run short, and this mean particle diameter exceeds 20 micrometers when this mean particle diameter is less than 3 micrometers -- a paint film -- admiration may be emphasized too much glitteringly and it may not be desirable

[0035]

Moreover, the aluminium flake particle which is a base particle of the aluminium flake pigment of this invention requires that the average of the diameter of the shortest / diameter of the longest should be 0.6 or more, and it is desirable that it is 0.7 or more. When the average of this diameter of the shortest / diameter of the longest is less than 0.6, there is an inclination for sufficient brightness not to be obtained. With [the average of this diameter of the shortest / diameter of the longest] 0.6 [or more], an upper limit is not asked, but 1 is not exceeded with a natural thing.

[0036]

Here, the diameter of the shortest of an aluminium flake particle is a concept from which the thickness of an aluminium flake particle differs. The diameter of the shortest of an aluminium flake particle is a concept meaning the diameter of the shortest of the part of the shape of the plane of an aluminium flake, or a curved surface.

[0037]

Moreover, it is desirable that the average aspect ratio of an aluminium flake particle 10 micrometers or less has a diameter in the range of 8-20 with the aluminium flake pigment of this invention among the aluminium flake particles which are base particles of an aluminium flake pigment, and it is still more desirable that it is in the range of 9-15. When this average aspect ratio is less than eight, sufficient flake-ization of a very fine particle is not made, but as a result, muddiness occurs in a paint film, the brightness of a paint film falls, and there is an inclination used as what was inferior in design. When this average aspect ratio exceeds 20, bending and breakage of an aluminium flake particle arise in the circulation at the time of coating production, and there is an inclination for the so-called circulation-proof nature to fall.

[0038]

<Fatty-acid amount of adsorption>

Moreover, when the aluminium flake pigment of this invention is a leafing type aluminium flake pigment, it is desirable that the average of the fatty-acid amount of adsorption in the front face of the aluminium flake particle which is a base particle of an aluminium flake pigment is the range of 0.0008 - 0.002 mole/cm². When the average of this fatty-acid amount of adsorption is less than 0.0008, the stable leafing nature is not obtained, but there is an inclination for brightness to fall. Conversely, when the average of this fatty-acid amount of adsorption exceeds 0.002, sufficient leafing value is not acquired, but there is an inclination for brightness to fall similarly also in this case.

[0039]

<The manufacture approach of an aluminium flake pigment>

The manufacture approach of the aluminium flake pigment of this invention is the manufacture approach of the above-mentioned aluminium flake pigment, and is the manufacture approach of the aluminium flake pigment which uses grinding equipment equipped with grinding media, and is equipped with the step which flake-izes an aluminium powder in an organic solvent.

[0040]

<The configuration and diameter> of grinding media

The quality of the material of the grinding media used for this invention has the desirable grinding media which consist of the quality of the material which contains steel, such as stainless steel, from the field of specific gravity and economical efficiency. Furthermore, as for the grinding media used for this invention, it is desirable to contain the spherical media in the range whose diameter is 0.3mm - 1.5mm. However, there is no need that these grinding media are real ball-like media although it is spherical media, and it should just be spherical media substantially. Moreover, it is desirable especially if the diameter contains the grinding media in the range which is 0.5-1.0mm as these grinding media.

[0041]

In the usual grinding process, this invention person found out that it was effective to make the diameter of these grinding media small to the range of 0.3mm - 1.5mm, in order to grind the detailed aluminium powder which is not flake-ized in the shape of a flake.

[0042]

And since the periphery section of a particle served as a notched configuration inevitably, the aluminium flake particle by which this invention person was flake-ized with fragmentation found out bringing about the fall of brightness. On the other hand, the periphery section of the aluminium flake particle which this invention person was not accompanied by fragmentation of a particle, but was only flake-ized is a smooth curve-like, and fulfilling the indispensable condition of the aluminium flake particle which shows high brightness also found out.

[0043]

In addition, generally grinding means flake-ization and existence of fragmentation of a particle is not asked in many cases. However, on these specifications, grinding shall mean the process which flake-izes an aluminium powder, without being substantially accompanied by fragmentation of a particle.

[0044]

Here, if the grinding media to which a diameter exceeds 1.5mm occupy most, the trap of the detailed aluminium powder is carried out between grinding media, and the aluminium powder concerned will become that it is hard to be ground, and will no longer tend to be flake-ized efficiently. Moreover, for the aluminium powder ground, there is an inclination for the energy given to an aluminium powder from grinding media by one contact to become large too much, and for the average of the diameter of the shortest / diameter of the longest to tend to become less than 0.7. On the other hand, when less than 0.3mm grinding media occupy [a diameter] most, the weight of grinding media is too light, the grinding force is inferior, grinding time amount is taken too much, and there is an inclination which cannot grind a parenchyma top aluminium powder.

[0045]

In addition, as these grinding media, two or more sorts of grinding media from which a path differs may be mixed and used. Moreover, the grinding media to which a diameter exceeds 1.5mm may be contained in the grinding equipment used for this invention. That is, in the manufacture approach of this invention, it is important to flake-ize an aluminium powder using the grinding media containing the grinding media whose diameter is 0.3-1.5mm. What is necessary is just to change the amount of the grinding media whose diameter is 0.3-1.5mm according to the amount of the raw material aluminium powder fed into grinding equipment.

[0046]

<Mean particle diameter of a raw material aluminium powder>

It is desirable that it is in the range of 1.0-10.0 micrometers, and if the mean particle diameter (D50aluminum) of the raw material aluminium powder used for this invention is in the range which is 1.0-6.0 micrometers, it is still more desirable.

[0047]

The diameter of the aluminium flake which is the base particle of the aluminium flake pigment after

grinding when this D50aluminum exceeds 10.0 micrometers becomes large, therefore the orientation of an aluminium flake pigment may be in disorder at the time of formation of a paint film, BUTSU may be seen on a paint film front face according to ejection of an aluminium flake pigment, or it may be [which whose admiration is too strong glitteringly and it is not rarely / good / in design depending on an application] a paint film further. On the other hand, when this D50aluminum is less than 1.0 micrometers, even if the diameter contains the grinding media in the range which is 0.3-1.5mm, -izing of the aluminium powder cannot be carried out [flake] efficiently, but there is an inclination for sufficient paint film brightness not to be obtained.

[0048]

<The ratio of the mean particle diameter of a raw material aluminium powder, and the diameter of grinding media>

It is desirable that the mean particle diameter (D50aluminum) of a raw material aluminium powder, the diameter (DB) of grinding media, and the ratio (D50 aluminum/DB) of ** are in the range of 0.001-0.02 by the manufacture approach of this invention, and it is still more desirable if it is in the range of 0.0015-0.008. When the value of this D50 aluminum/DB is in the aforementioned range, it is because the effectiveness which flake-izes a detailed aluminium powder increases further.

[0049]

Since the gap of grinding media is too large as compared with a raw material aluminium powder when the value of this D50 aluminum/DB is less than 0.001, there is an inclination for a raw material aluminium powder to flake-be hard to beized efficiently. On the other hand, to a raw material aluminium powder, when the value of D50 aluminum/DB exceeds 0.02, since grinding media are too small, there is an inclination for the grinding force in which there are mass of each grinding media and a correlation to be insufficient, and to be unable to grind a raw material aluminium powder efficiently, but for the fines of the aluminum which is not flake-ized to remain, and for the brightness of a paint film to fall.

[0050]

<The ratio of the mass of a raw material aluminium powder, and the volume of an organic solvent>

It is desirable that the mass (WAl (kg)) of a raw material aluminium powder, the volume (Wsol (L)) of an organic solvent, and the ratio (WAl/Wsol) of ** are in the range of 0.1-0.3 by the manufacture approach of this invention, and it is still more desirable if it is in the range of 0.14-0.20. Since the value of WAl/Wsol becomes [the slurry viscosity at the time of grinding] low less than by 0.1, swimming occurs in a raw material aluminium powder, and there is an inclination which cannot grind a raw material aluminium powder to homogeneity. On the other hand, when the value of WAl/Wsol exceeds 0.3, the viscosity of the slurry at the time of grinding becomes high too much, a motion of grinding media is controlled, and there is an inclination which cannot carry out [flake]-izing of the raw material aluminium powder to homogeneity.

[0051]

<The rotational frequency in the case of using a ball mill as grinding equipment>

Although the class of grinding equipment is not limited but well-known grinding equipment can be conventionally used suitably especially by the manufacture approach of this invention, the grinding equipment of the attritor mold which equipped the interior with the revolving arm, a cylinder-like ball mill, etc. can be used preferably, for example. Moreover, it is desirable also in above grinding equipment to use a cylinder-like ball mill especially from the field of quality or productivity.

[0052]

In addition, in the manufacture approach of this invention, when using a ball mill, it is desirable to make the rotational frequency of a ball mill into 95% or less of a critical rotational frequency. When the critical engine speed said here raises an engine speed more than it, a ball says the engine speed fixed by the centrifugal force to a ball mill wall, and is shown to it by the following formulas (1).

$$n = 1/(2\pi) \times (g/r)^{1/2} \dots (1)$$

(In addition, in a formula (1), an engine speed (rpm) and g express gravitational acceleration (3,528,000 cm/min²), and, as for r, n expresses a ball mill radius (cm).)

Since the grinding effectiveness becomes strong, sufficient flake-ization cannot be performed, but a conversely big flake particle is divided and microscopic grains are made also in the grinding effectiveness when the rotational frequency of a ball mill exceeds 95% of a critical rotational frequency, there is an inclination for the brightness of a paint film to fall.

[0053]

<Other grinding conditions>

In the manufacture approach of this invention, it is desirable to perform grinding under existence of a grinding assistant. Although it is not limited but is conventionally usable in a well-known thing especially as a grinding assistant, it is suitably usable in fatty acids, such as oleic acid and stearin acid, fatty amine, an aliphatic series amide, fatty alcohol, an ester compound, etc., for example.

[0054]

The aforementioned grinding assistant controls unnecessary oxidation of an aluminium flake pigment front face, and has the effectiveness of improving gloss. Its range of 0.1 - 20 mass section is desirable to the raw material aluminium-powder 100 mass section, and if the addition of the grinding assistant at the time of grinding is the range of 0.5 - 10 mass section, it is still more desirable. When condensation of the aluminium flake whose addition of a grinding assistant is the base particle of an aluminium flake pigment under in the 0.1 mass section arises, there is a possibility that the surface gloss of an aluminium flake pigment may fall and the addition of a grinding assistant exceeds 20 mass sections by one side, there is a possibility that the physical properties of a coating may fall.

[0055]

Although high-class saturated fatty acid, such as stearin acid, is used when an aluminium flake pigment is a leafing type, the temperature control at the time of grinding is important. By keeping whenever [mill internal temperature / at the time of grinding] at 20-45 degrees C, the amount of adsorption of the fatty acid on the front face of an aluminium flake which is the base particle of an aluminium flake pigment can be maintained at 0.0008 - 0.0020 mole/cm². When there is an inclination which the amount of adsorption increases [grinding temperature] at less than 20 degrees C and it exceeds 45 degrees C, there is an inclination which decreases conversely.

[0056]

It is desirable that the ratio of the amount of the raw material aluminium powder at the time of grinding and the amount of grinding media is in the range of 20-200 by the manufacture approach of this invention. If there is an inclination for productivity to fall [the aforementioned ratio] less than by 20 and the aforementioned ratio exceeds 200, while grinding time amount becomes very long, slurry viscosity goes up too much during grinding, and it may be unable to grind efficiently.

[0057]

By the manufacture approach of this invention, especially the organic solvent at the time of grinding is not limited, but although it is conventionally usable in a well-known thing, hydrocarbon system solvents, such as a mineral spirit and solvent naphtha, the solvent of an alcoholic system, an ether system, and an ester system, etc. can be used for it, for example. Generally, in consideration of the problem on insurance, such as inflammability to the solvent at the time of grinding, the hydrocarbon system solvent of a high-boiling point is used suitably.

[0058]

<A coating and ink>

The aluminium flake pigment of this invention can be blended with a coating, ink, a rubber constituent, a plastics constituent, an elastomer constituent, etc., and can give high brightness and brightness to those constituents etc.

[0059]

The coating and ink of this invention contain the aluminium flake pigment of this invention, and a binder. Moreover, the coating and ink of this invention may contain the aluminium flake pigment of this invention, a binder, and a solvent. Furthermore, the coatings of this invention may be powder coatings.

[0060]

It is desirable to blend the aluminium flake pigment of this invention with the coating and ink of this invention in the range of 0.1 - 30 mass %. Moreover, other color pigments, a color, various additives, etc. can be added to the coating and ink of this invention if needed.

[0061]

Although it is not limited but well-known material can be conventionally used especially as a solvent used for the coating and ink of this invention For example, a mineral spirit, a hexane, a heptane, a cyclohexane, Aromatic hydrocarbon, such as aliphatic hydrocarbon, such as an octane, benzene, toluene, and a xylene, Halogenated hydrocarbon, such as chlorobenzene, trichlorobenzene, perchloroethylene,

and trichloroethylene, Alcohols, such as a methanol, ethanol, n-propyl alcohol, and n-butanol, Ether, such as ester, such as ketones, such as n-propanone and 2-butanone, ethyl acetate, and propyl acetate, a tetrahydrofuran, diethylether, and the ethyl propyl ether, other turpentine oil, etc. are mentioned. Moreover, the solvent concerned is independent, or two or more sorts can be mixed and used for it.

[0062]

Moreover, although the above-mentioned explanation is the case where a solvent is an organic solvent, the solvent used for the coating and ink of this invention may be water. In this case, it is usable also as a water coating and ink by covering the aluminium flake pigment of this invention with a resin constituent or the Lynn system compound, and blending it with a binder and water on it.

[0063]

Although it is not limited especially as a binder used for the coating and ink of this invention but the well-known resin for paint film formation etc. can be used suitably conventionally, acrylic resin, polyester system resin, alkyd resin, a fluororesin, etc. are mentioned, and it can also be used, for example, combining with cross linking agents, such as amino resin and block poly isocyanate resin. The lacquer and 2 liquid type polyurethane resin which are hardened by the air drying other than these resin, silicone resin, etc. can be used. In the case of the binder used for the ink constituent of this invention, natural resin, such as oil of linseed oil and castor oil, phenol resin, and rosin, etc. can be suitably blended other than these if needed. Moreover, the binder concerned is independent, or two or more sorts can be mixed and used for it.

[0064]

Moreover, although it is not limited but a well-known color pigment can be conventionally added to extent which does not spoil the property of this invention especially as a color pigment which can be added in the coating and ink of this invention, inorganic pigments, such as organic pigments, such as the Quinacridone red, a copper phthalocyanine blue, Phthalocyanine Green, isoindolinone yellow, carbon black, perylene, and an azo lake, ferrous oxide, titanium oxide, cobalt blue, a zinc white, ultramarine blue, chrome oxide, a mica, and the chrome yellow, etc. can use it suitably, for example. Moreover, the color pigment concerned. Not only a kind but two sorts or more can be mixed, or it can also be added and used for coincidence.

[0065]

Moreover, in the coating and ink of this invention, an ultraviolet ray absorbent besides these, a thickener, a destaticization agent, a dispersant, an antioxidant, a gloss broth agent, a surfactant, a synthetic preservative, lubricant, a plasticizer, a curing agent, a filler (reinforcement), a wax, etc. may be added if needed.

[0066]

<The method of application of a coating, and the printing approach of ink>

As an approach of painting the coating of this invention, a well-known approach can be adopted conventionally, and brush painting, a spray method, the doctor blades method, the roll coater method, the bar coating-machine method, etc. are mentioned. moreover -- as the approach of printing using the ink of this invention -- Toppan Printing, such as intaglio printing, such as gravure, offset printing (or it is also called decalcomania), and screen-stencil, -- law, a lithography method, etc. are mentioned.

[0067]

Moreover, although especially the base materials as the coating of this invention and a coated object of ink can be suitably used if they are the goods which are not limited but can apply a coating and ink, household articles, such as sound products, such as containers, such as optical instruments, such as the bodies, such as an automobile, a motor bicycle, a bicycle, and its other car, and a component of those, and a camera video camera, OA equipment, sporting goods, cosmetics, and a drink can, a radio cassette recorder, and a CD player, and a cleaner, telephone, television, etc. be mentioned, for example.

[0068]

Moreover, although the quality of the material of the base material concerned is not limited especially, either but can use a well-known thing conventionally, plastic material, such as inorganic materials, such as ceramics, glass, cement, and concrete, natural resin, and synthetic resin, a metal, wood, paper, etc. are mentioned, for example. As an example of the substrate which makes a metal the quality of the material, substrates which make these alloys and casting the quality of the material, such as iron, copper, aluminum, tin, and zinc, are mentioned. In addition, as for the substrate which makes these metals the

quality of the material, it is desirable that chemical conversion is beforehand carried out by phosphate, a chromate, etc.

[0069]

Moreover, especially plastic material applicable to the quality of the material of the above-mentioned substrate is not limited, but can adopt suitably the plastics constituent used conventionally. For example, polyester resin, Nylon, polyphenylene oxide resin, Polyphenylene sulfide resin, polyether ether ketone resin, An epoxy resin, ABS plastics, acrylic resin, a polycarbonate, polyolefine system resin, An ethylene-propylene copolymer, AES resin, an AS resin, vinyl chloride resin, Polystyrene resin, polyamide system resin, PET and PBT, polyarylate, The substrate which makes the plastics constituent containing these copolymers, such as polyacetal, polyphenylene ether, the poly methyl pentene, a polyphenylene sulfide, polybutadiene, polyether sulphone, and polysulfone, or mixture, a denaturation object, etc. the quality of the material is mentioned. These can use one sort or two sorts or more.

[0070]

By the mode of the coating of this invention, when required, the sequential paint of a ground coat, a paint film, the finishing paint film, etc. may be carried out. In this case, each paint film may be painted, the following paint film may be painted after hardening, and after painting each paint film by the so-called wet-on wet paint, the following paint film may be painted, without making it harden. However, in order to obtain a paint film with photoluminescent [of the good mirror plane], it is desirable to paint a ground coat and to paint a metallic paint film after hardening. The hardening approach of the coating of each paint film may be heat curing, and may be room temperature setting.

[0071]

In this case, although especially the thickness of a ground coat is not limited, in a general operation gestalt, it is desirable that it is the range of 10-200 micrometers. Moreover, although especially the thickness of a paint film is not limited, in a general operation gestalt, it is desirable that it is the range of 1-100 micrometers. Although especially the thickness of a finishing paint film is not limited, in a general mode, it is desirable that it is the range of 5-300 micrometers.

[0072]

[Example]

Although an example is given and this invention is hereafter explained more to a detail, this invention is not limited to these.

[0073]

<Example 1>

In the cylindrical ball mill with a diameter [of 500mm], and a die length of 180mm, the mineral spirit was supplied as 800g and an organic solvent, 80g of oleic acid was supplied as 4L and a grinding assistant, respectively, and the raw material aluminium powder 40kg and whose mean particle diameter are 4.6 micrometers about the shot whose diameter is 0.7mm as grinding media was ground for 13 hours by rotational frequency 41rpm (68% of a critical rotational frequency). The temperature under grinding was kept at 20 degrees C - 40 degrees C with the engine water jacket.

[0074]

The slurry after grinding process termination and in a ball mill was probed by the mineral spirit, it applied to the oscillating screen of 150 meshes, 350 meshes, and 400 meshes one by one, and solid liquid separation of the passed slurry was carried out with the pan filter. The filter cake obtained after that was moved in the kneader mixer, (85% of nonvolatile matters) was kneaded for it for 1 hour, and the aluminium flake pigment (80% of nonvolatile matters) was obtained.

[0075]

<Examples 2-6 and the examples 1-3 of a comparison>

Using the ball mill used in the example 1, manufacture conditions were changed as shown in Table 1, and the grinding process was presented with them. After grinding termination obtained the aluminium flake pigment (80% of nonvolatile matters) by the same approach as an example 1.

[0076]

[Table 1]

製造条件												
原料アルミニウム 粉末	ミネラル スピリット		磨砕助剤	磨砕 助剤量 (g)	回転数 (rpm/ 対臨界%)	磨砕 時間 (時間)	磨砕 温度 (°C)	鋼球 量 (kg)	鋼球 直径 (mm)	D50 _A /D _B	W _A /W _{sol}	
	D50 _A (μm)	W _{sol} (%)										
実施例1	0.8	4.6	4.0	オレイン酸	80	41/68	13	30	40	0.7	0.0066	0.200
実施例2	1.0	3.5	5.0	ステアリン酸	190	35/80	10	30	50	1.2	0.0029	0.200
実施例3	1.0	3.5	5.0	ステアリン酸	190	35/80	10	18	50	1.2	0.0029	0.200
実施例4	1.0	1.7	4.2	ステアリン酸	190	35/80	12	35	50	1.2	0.0014	0.238
実施例5	1.0	4.5	4.0	ステアリン酸	190	40/67	10.5	30	40	0.7	0.0064	0.250
実施例6	1.0	4.5	4.0	ステアリン酸	190	50/83	16	30	40	0.5	0.0090	0.250
比較例1	0.8	3.8	4.6	オレイン酸	80	49/82	10	30	40	1.2	0.0032	0.174
比較例2	3.0	10	2.0	ステアリン酸	115	29/88	8.0	35	50	6.4	0.0016	1.500
比較例3	1.5	15	1.9	オレイン酸	80	40/100	6.5	30	50	6.4	0.0023	0.789

[0077]

<Production of a color card>

5.0g (80% of nonvolatile matters) of aluminium flake pigments obtained in examples 1-6 and the examples 1-3 of a comparison was extracted in 200ml PP cup, toluene 5.0g was added and it was left 30 minutes or more, and it agitated with the glass rod until it distributed completely after that. the object for after [distribution] metallic paints -- varnish M6301-45 (Dainippon Ink & Chemicals make, alkyd

resin) 40.0g was added, the HOMODI spur distributed for 10 minutes by 800rpm, and the coating was adjusted.

[0078]

The above-mentioned coating which contains the aluminium flake pigment obtained in examples 1-6 and the examples 1-3 of a comparison, respectively was applied on the tin plate by the bar coating machine of No. 10.

[0079]

Then, the color card which contains the aluminium flake pigment which was dried for 10 minutes at 140 degrees C, and was obtained in examples 1-6 and the examples 1-3 of a comparison, respectively was obtained.

[0080]

<Performance evaluation>

The average of the mean particle diameter of the aluminium flake pigment obtained in examples 1-6 and the examples 1-3 of a comparison, and the diameter of the shortest / diameter of the longest and the average aspect ratio of a particle with a diameter of 10 micrometers or less were measured. Moreover, about the leafing type aluminium flake pigment, the amount of fatty acids which is sticking to a front face was measured. Furthermore, the painted surface of the color card of the above-mentioned color card containing an aluminium flake pigment was covered with the 150x100x2mm glass plate, and brightness (IV value) was measured by Al Koepp LMR-200 (Kansai Paint Co., Ltd. make). These results are shown in Table 2.

[0081]

[Table 2]

性能評価				
フレークの平均 粒子径(μm)	最短径/ 最長径	10 μm 以下の粒子の 平均アスペクト比	吸着 脂肪酸量 (mol/cm^2)	塗膜 輝度 IV値
13.1	0.69	9.0	0.00045	183
12.4	0.78	10.4	0.00135	239
12.4	0.78	9.0	0.00290	180
6.9	0.72	7.5	0.00119	229
12.1	0.65	9.2	0.00121	243
11.9	0.62	9.8	0.00120	250
13.4	0.57	6.6	0.00037	143
14.6	0.52	5.2	0.00135	160
23.9	0.49	5.4	0.00054	103

[0082]

In addition, about the mean particle diameter of a raw material aluminium powder and an aluminium flake pigment, it measured on condition that the following in the figure in Table 2 with the laser diffraction type particle-size-distribution measuring device (the Honeywell, Inc. (Honeywell) make, micro truck HRA).

[0083]

(i) In the case of a raw material aluminium powder

It measured, after having mixed 0.01g of hexametaphosphoric acid, having agitated 0.5g of raw material aluminium powders with the glass rod, feeding them into circulating water within system of measurement and distributing them for 2 minutes ultrasonically.

[0084]

(ii) In the case of an aluminium flake pigment

It measured, after having agitated 0.5g [of aluminium flake pigments] (80% of nonvolatile matters), and toluene 11.0g with the glass rod, supplying to the circulation solvent within system of measurement (ethanol/IPA) and making it distribute for 30 seconds ultrasonically.

[0085]

Moreover, among the aluminium flake particles which are base particles of an aluminium flake pigment, the average aspect ratio of an aluminium flake 10 micrometers or less cut the above-mentioned color card on 1.5cm square, the diameter ground the sample front face embedded at the epoxy resin flat and smooth, made it the observation sample so that a cutting color card might become perpendicular to a sample front face, and it asked for it by observing the condition of the aluminium flake in a paint film cross section in digital HD microscope VH-7000 (product made from KEYENCE). That is, it is the observed aluminium flake on a screen Image-Pro PLUS Thickness d of each aluminium flake and a major axis D were measured using ver.4 (product made from MEDIACYBERNETICS). At this time, the major axis D calculated the aspect ratio (D/d) of all 50 or more aluminium flakes that made the particle number of 10 micrometers or less 50 or more pieces, and were adopted, and the diameter made that average the average aspect ratio of an aluminium flake 10 micrometers or less among the aluminium flake particles which are base particles of an aluminium flake pigment.

[0086]

In addition, although the aspect ratio of each aluminium flake which could not necessarily say the major axis D observed from a cross section as the thing showing each major axis of an aluminium flake, but was computed based on it included some errors, it is making the measurement number into 50 or more pieces, and the average of each aspect ratios of these was defined as an average aspect ratio.

[0087]

Moreover, the average of the diameter of the shortest / diameter of the longest is the aluminium flake which observed with the scanning electron microscope (SEM S-2300 Hitachi make), and was observed after washing and powder-izing an aluminium flake pigment (80% of nonvolatile matters) with an acetone on a screen Image-Pro PLUS Using ver.4 (product made from MEDIA CYBERNETICS), the diameter of the shortest and the diameter of the longest were measured by the aluminium flake of a piece, and it defined by the average of 50 particles.

[0088]

Moreover, the amount of fatty acids which stuck to the aluminium flake front face After washing and powder-izing an aluminium flake pigment (80% of nonvolatile matters) with an acetone, It calcinates at 350 degrees C in the sealed heating cylinder (product made from ADVANTEC). It is INTERARED about CO2 amount generated by combustion of the organic substance which is sticking to an aluminium flake front face. GAS ANALYZE CO2 which measured by URA-107 (Shimadzu make) and was calculated It asked by converting by the measured stearin acid calibration curve, and *(ing) with the specific surface area of an aluminium flake.

[0089]

Here, after the specific surface area of an aluminium flake washed and powder-ized the aluminium flake pigment (80% of nonvolatile matters) with the acetone, it was measured with the specific-surface-area measuring device (BET adsorption method Flow Sorb II2300 Shimadzu).

As shown in Table 2 of the above-mentioned evaluation result, the paint film using the coating containing the aluminium flake pigment indicated by this invention is understood that brightness is remarkably high compared with the example of a comparison.

[0090]

It should be thought that the gestalt and example of operation which were indicated this time are [no] instantiation at points, and restrictive. The range of this invention is shown by the above-mentioned not explanation but claim, and it is meant that all modification in a claim, equal semantics, and within the limits is included.

[0091]

[Effect of the Invention]

From the above-mentioned evaluation result, it can be said that brightness is a high aluminium flake pigment also when mean particle diameter is small, and the aluminium flake pigment of this invention is an aluminium flake pigment which was very excellent in design nature. That is, it can be said that the aluminium flake pigment of this invention has small mean particle diameter, and is an aluminium flake

pigment which has high brightness and brightness in coincidence.

[0092]

Moreover, the manufacture approach of the aluminium flake pigment of this invention can also flake-ize a detailed aluminium powder disc-like by using the grinding equipment containing steel grinding media in the range whose diameter is 0.3mm - 1.5mm. Therefore, the obtained aluminium flake pigment has small mean particle diameter, and has high brightness and brightness in coincidence. That is, the manufacture approach of the aluminium flake pigment of this invention has small mean particle diameter, and is the manufacture approach of an aluminium flake pigment of having high brightness and brightness in coincidence.

[0093]

Furthermore, the coating of this invention is a coating in which high brightness and brightness are shown. And the ink of this invention is ink in which high brightness and brightness are shown.

[Translation done.]